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ABSTRACT

This paper describes the integration of computers into two preschool classrooms in the Child Development Laboratories at the University of Tennessee. Before the placement of the computers in fall 1996, conversations with teachers revealed concerns about how best to use the computers. As a result of these discussions, a plan for training and evaluation was developed that focused on how to increase teachers' familiarity and comfort with the technology. Shortly thereafter, hardware and software were purchased, and training was initiated. Observation of the classrooms in spring 1997 revealed unintended outcomes and effects. Even with an ongoing training plan for the computers in place, teachers struggled with the integration of the computers in the curriculum. On the positive side, the computer center became a significant parental interest and a place of frequent parent-teacher communication. Hence, as teachers became comfortable with the use of the computers into their classrooms, they also focused on how to use the technology as a tool for child observation and how to share that information with the children's families. A plan for integrating the computers into the whole curriculum still needs to be developed. The major challenge has been finding the time and resources to use computers effectively. Only continued planning, evaluation, and reevaluation will allow for the full and optimal use of computers in the early childhood setting. The paper concludes with two appendices: (1) "Instructional Technology Standards for Teacher Licensure in the State of Tennessee" and (2) "Some Examples of Teacher Ideas for Extension of Software Activities." (LPP)

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"But How Do We Use It?": Discovering Hidden Barriers and Unanticipated Successes in Integrating Computers in a Preschool Curriculum

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Abstract

This paper describes the integration of computers into two preschool classrooms in the Child Development Laboratories at the University of Tennessee. Before the placement of the computers in fall 1996, conversations with teachers revealed concerns about how best to use the computers. As a result of these discussions, a plan for training and evaluation was developed that focused on how to increase teachers' familiarity and comfort with the technology. Shortly thereafter, hardware and software were purchased, and training was initiated. Observation of the classrooms in spring 1997 revealed unintended outcomes and effects. Even with an ongoing training plan for the computers in place, teachers struggled with the integration of the computers in the curriculum. On the positive side, the computer center became a significant parental interest and a place of frequent parent–teacher communication. Hence, as teachers became comfortable with the use of the computers into their classrooms, they also focused on how to use the technology as a tool for child observation and how to share that information with the children's families. A plan for integrating the computers into the whole curriculum still needs to be developed. The major challenge has been finding the time and resources to use computers effectively. Only continued planning, evaluation, and reevaluation will allow for the full and optimal use of computers in the early childhood setting.

Introduction

Meeting the challenge of technological literacy has been established as a critical goal for the American educational system (U.S. Department of Education, 1996). Yet, how does one begin the journey into technological literacy? How does a group with very little access to or experience with computers move from beginning use of technology to teaching with technology? And how does this transition happen in an early childhood education setting with the dual goals of teaching children and preparing teachers?

These questions were central when our program began to explore the possibilities of placing computers in our preschool classrooms in the Child Development Laboratories (CDL) at the University of Tennessee. This paper discusses the process of integrating computers into the preschool curriculum and describes our journey into technology use in an early childhood environment.

Taking the First Steps, or Why We Did This

The Department of Child and Family Studies at the University of Tennessee prepares undergraduate and graduate students for careers in programs for young children and their families. Within this program, teacher licensure in early childhood education (pre-kindergarten through grade 3) is granted upon successful completion of a fifth-year postbaccalaureate experience in the public schools. The department's CDL provides an integral component of the program as a primary placement site for practicum experiences. This full-day, year-round program serves children from infancy through age 5. The CDL affords opportunities for students in the program to gain proficiency in the abilities needed for successful careers while being trained within a model program.

Because the program prepares teachers, its curriculum must meet state and National Council

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for Accreditation of Teacher Education (NCATE) standards for initial licensure. In 1996, the state mandated that several instructional technology standards be in place for initial teacher licensure no later than September 1, 1996. A key standard stated that teacher licensure candidates should have the "ability to integrate instructional technology into the classroom to facilitate interdisciplinary teaching and learning, supplement instructional strategies, design instructional materials, and enhance hands-on experiences and problem-solving" (see Appendix A for full guidelines). Thus, the stimulus for the integration of technology within the CDL program did not arise from within the program but from outside.

Moving Ahead, or Where We Went

Our first step into the use of technology was taken, not because we wanted to, but because we had to! As one of the most technologically literate people on the faculty, the first author was called upon to be a resource in the development of an action plan. Upon consulting departmental faculty and lab staff, it became clear that to meet the state-mandated competencies, computers needed to become a part of our preschool class curriculum. From this point, two separate yet interrelated steps were needed. First, hardware decisions and acquisitions had to be made. Second, a training plan was needed to help teachers use computers effectively in their classrooms. Identification and purchase of appropriate software were included within this step.

Step 1: Getting the Hardware

At the time (spring 1996), funding was available for an initial purchase of two computers. While the CDL has three preschool classrooms, a decision was made to place computers in the two classrooms serving the oldest children. This decision was based in part on the thinking that the younger children (3-year-olds) would move up to the classroom with the computer the following year. Additionally, these children did have an opportunity to use the computers at the beginning and ending of each day, because the children rotated classrooms.

Financial and university restrictions at that time limited the choices of hardware. After reviewing the options, we purchased two dual-platform Apple Macintoshes. Although our college operates primarily in a PC environment, we chose the Macintosh dual-platform computers because our students would be entering an environment that was primarily Apple/Macintosh based. While recent developments in technology are making the two environments more interchangeable, at the time, we felt that students needed experience with the Macintosh environment. The rationale for this purchase seemed sound, but in hindsight, we question this decision because the lack of technical support has become an enduring problem and challenge.

Step 2: Training and Software

Before the placement of the computers in the classrooms (fall 1996), conversations with classroom teachers revealed several concerns surrounding the use of computers. One set of questions focused on the downside of the use of computers by the children. Concerns expressed included fear that (1) the computer would replace other activities, (2) computer programs would stifle creativity and be strongly convergent, and (3) computers would increase social isolation. A second set of concerns voiced by staff was their own experience (or lack of experience) with computers. Teachers worried that their lack of knowledge might result in damage to the computers. Teachers were also insecure about their ability to help children "learn" how to use and care for the computer. Embedded within this concern were the issues surrounding the selection and use of appropriate software in the classroom.

A third set of concerns underlying computer use by children was not voiced as much by the classroom teachers but is perhaps the more critical (and continual) challenge of using computers in any classroom setting—that is, fully integrating computers into the curricula so that computers become more than an add-on.

These types of concern were not unusual for early childhood educators (Bredekamp & Rosegrant, 1994; Haugland & Wright, 1997; National Association for the Education of Young Children [NAEYC], 1996). However, because our program also prepares teachers, computer integration within the curriculum is critically important. As a result, a formal plan for training and evaluation was developed that focused on how to increase teachers' familiarity and comfort with the use of technology. This training plan was instituted in fall 1996 and included (1) the purchase of the NAEYC book *Young Children: Active Learners in a Technological Age* (Wright & Shade, 1994) for each

staff member using technology in his or her classroom, (2) an initial in-service training session provided by an outside early childhood educator who had successfully integrated technology into her teaching, and (3) ongoing observation and assessment of the CDL's process of integration.

As part of this process, we decided that inaugural software purchases would be those that had been recommended by other locally known early childhood professionals. Given our inexperience with software selection, we believed this type of recommendation was best for the program and that the software purchased would be of "high quality." These initial purchases of software included a utility program (KidsDesk) to protect the hard drive from child manipulation and six pieces of software that in general could be classified as more open ended.

The use of technology began slowly as teachers increased their familiarity with the operating system and software applications. Initially when the computers were placed in the classroom, there were several ongoing glitches that impeded full progress and satisfaction on the part of the teachers. Hard drive failures, insufficient memory, and a broken mouse were just some of the problems encountered in the first few months of integration in the classroom. The lack of consistent technical support for the Macintosh environment within our college continues to be a problem in getting solutions to even the simplest hardware difficulties. Another problem initially encountered was the temporary lack of printers due to a shortage of funds. While printers are not necessary for the operation of computers, the full and developmentally appropriate use of computers with young children is greatly aided by the ability to print. A final problem encountered was the popularity of the computer area as an activity area. Teachers struggled with the difficulty of monitoring and establishing a policy of "fair use." Use of a chart and timer was instituted by the teachers to ensure that all children who wanted an opportunity to use the computer had a chance to do so.

Initial Observations

During spring semester 1997, glitches had decreased so that the more formalized observation of the two classrooms began. These observations were independently conducted by the second and third authors of this paper. General conclusions from the observations were that despite initial concerns that children would be solitary figures at the computer, quite the opposite was the case. Children were often observed communicating and assisting each other at the computer. Another unanticipated effect was that the computer center became a significant parental interest and a place of frequent parent–teacher communication. Children would want to show their parents what they could do on the computer, and teachers would assist the children and comment on these activities to parents. Thus, the computer center has become one of the most social centers of the room.

Even with an ongoing training plan for the computers in place, teachers struggled with the integration of the computers in the curriculum. The observations in the spring semester found that use of the computer in group time had been limited. Additionally, the computer had not been used in conjunction with other activities. Finally, software was introduced by "trial and error." New software often just appeared without discussion with the children about how it could be used. Because of limited time and resources, teachers had little opportunity to review the software outside of the classroom to discover its maximum potential in the classroom. Additionally, a plan for changing out the software was missing. Unlike other classroom material, which is rotated in and out of the classroom setting, all software was likely to be continually available for the children's use.

The Future, or Where Do We Go

Based on the observations during the spring semester, the following recommendations can be made for integrating computers in the classroom. First, staff development training must be hands-on, ongoing, and developmentally appropriate. The scarcity of computers outside of the classroom limited teachers' access to the machines. Time also is key in the integration of computers. One in-service training session does not begin to address the need for experiential learning when it comes to computer technology. Teachers, like children, need time for processing and reflection.

We found the computer area to be quite social in terms of child-to-child or teacher-to-parent interaction. However, in general, teachers did not spend large amounts of time facilitating individual children's learning. Teachers often were only in the computer area to troubleshoot a problem, change software, or monitor children's time using the computer. A more direct acknowledgment of the teacher's role in facilitating the use of the computer in learning is an ongoing concern.

An unintended effect was that the computer center was one of significant parental interest and became a place of frequent parent–teacher communication. Hence, as teachers developed more comfort with the use of the computers in their classrooms, they needed to also focus on how to use the technology as a tool to share that information with the children's families.

The use of a timer is an ongoing concern and is under discussion within our program. Children were not able to adequately explore a program when time was limited. This problem may be alleviated somewhat with the recent acquisition of four additional computers. These new computers allow us to have two computers in each of our preschool classrooms. However, we need a mechanism that allows the children deeper exploration of the software programs. Additionally, a record-keeping or observational system whereby teachers can track children's experiences with the computers is needed.

A plan for integration of the computer into the whole curriculum needs to be developed. Some beginning steps would be for teachers to fully explore the possibilities of the software. Knowing all the different applications and aspects of software packages is necessary for effective integration into the classroom. From that point, teachers can develop extension activities that enhance the concepts introduced within a piece of software (see Appendix B for an example). Staff meetings can be used to brainstorm other uses for computers within the classroom. At the time of our introduction of the computers, lesson plans did not include a section for the use of the computers as a teaching/learning center. The current evaluation of undergraduate students during their student teaching in our program does not include recognition of their use of technology in lesson planning. All of these aspects are part of the program's ongoing plan for the integration of technology.

The major challenge for the program has been finding the time and resources to use computers effectively in the classroom. This challenge is not unique to early childhood settings but is the difficulty of technology inclusion across educational settings. The dispositions of curiosity and lifelong learning are essential for successful integration in any setting. Only continued planning, evaluation, and reevaluation will allow for the full and successful use of computers in the early childhood setting.

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APPENDIX A

Instructional Technology Standards for Teacher Licensure in the State of Tennessee

Instructional Technology (the following knowledge and skills are integrated into the entire teacher education preparation program and build upon the basic technology requirements and capacities specified in NCATE standards for approval of teacher education units):

A. Ability to integrate instructional technology into the classroom to facilitate interdisciplinary teaching and learning, supplement instructional strategies, design instruction materials, and enhance hands-on experiences and problem solving.

B. Ability to manage different learning strategies and develop higher level thinking skills using various instructional based technology tools; ability to select, use and integrate appropriate technology-based resources relative to specific grade level and content of subject(s) being taught.

C. Understanding of types, characteristics, sources, and use of quality instructional software and other technology-based learning resources.

D. Understanding of software purchasing agreements and software copyright laws and the need to plan for legal usage; understanding of virus protection of software and policies for acceptable use of the communication capabilities of computer technology.

E. Understanding of basic computer hardware configurations, terminology, peripheral connectivity, telecommunications, and networking technology and concepts.

F. Ability to perform basic operating system tasks, software functions, and minor troubleshooting on the most current and available operating systems and components of computer technology.

G. Ability to work with software program menus to open and close application programs; load and install programs; create and edit documents; create and use a database; create and use a spreadsheet; transfer data or information originated on one software package to another using computer technology; utilize a software presentation package to create presentations for use on a computer technology projection system.

H. Ability to use a modem for communication and access to the Internet with computer technology; knowledge of the uses of audio, video, and optical technology for capturing and incorporating information and data for computer technology.

Required for all candidates for initial teacher licensure no later than September 1, 1996.

Source: Tennessee State Department of Education. (1995). *Teacher Education Program Matrix.* Nashville, TN: Tennessee State Department of Education.

APPENDIX B

Some Examples of Teacher Ideas for Extension of Software Activities

Software: Millie's Math House

Explore and Discover Mode: The character remains in the picture frame.

- Experimentation
- No right or wrong answer
- Play as long as you like

Question and Answer Mode: Click the character out of the picture.

- The character will ask questions or make requests.
- Offers praise for correct responses.

Adult Options: Press Option-Apple-A

Sample Activity Rooms:

A. Little, Middle, Big

- Explores concept of size. Identifies, compares, and examines similarities, differences in sizes.
- Expands vocabulary of "size words."
  *Click the cat to mix up shoes. Click again if you want to sort them by size.

Extenders:

1. In group, play a riddle game (i.e., "I see something larger than a block and smaller than you!") Allow children to come up with as many answers as they can.
2. Using a flannel board, either in a group time or quiet corner, make flannel people with various size hats, shoes, mittens, etc. Talk about concepts of "too big" and "too small." Compare sizes; create silly characters.

B. What's My Number?

- Recognizing the numbers 0-10.
- Understanding the concepts of one-to-one correspondence.
- Exploring basic addition and subtraction.
- Recognizing and reading number sentences, written or spoken numbers and the qualities it represents.
  *Click Dorothy Duck to repeat the question.

Extenders:

1. Games: Use beans, marbles, along with egg cartons to sort and count objects.

C. Number Machine

- Children will see, hear, and recognize the numerals 0–30 and hear these counted.
- Concept that numerals represent quantity presented.
- Hear singular and plural forms of nouns.

Extenders:

1. Group or quiet area: Find numbers in environmental print or books.
2. Art: Cut and paste numerals to make a number or counting book.

D. Bing and Bong

- Create and complete patterns.
- Recognize that a pattern is made up of regularly repeated parts and that the parts make a "whole."

*Each picture makes its own sounds—record children's own sounds by clicking the microphone.

Extenders:

1. Group: Ask the children to identify patterns in the environment (e.g., windows, walls, fabrics, stripes, wood trim, etc.).
2. Group: Clap out names of children or characters (e.g., Jen-ni-fer).

E. Mouse House

- Matching, discriminating sizes and shapes.
- identifying and labeling shapes, creating shapes.
- Discovering that shapes are the same, regardless of position or size.
- *Options—print; color designs; add bricks, scenery, and people.

Extenders:

1. For art, group, or the quiet corner: Cut out shapes or half shapes from fabric or flannel and let the children explore what they can create.
2. Cooking geometric pretzels

   1 pkg. dry yeast
   1 T. sugar
   1½ cups water
   1 t. salt
   4½ cups of flour

   Knead dough 5 minutes, add flour if necessary. Roll into "ropes," make shapes. Place on lightly greased cookie sheet. Brush lightly with water and sprinkle with salt. Bake 9 minutes at 475 degrees.
3. Art: Cut out flat sponges into shapes—sponge paint to create cities, structures, houses, etc. Display as murals.

Adapted from: *Millie's Math House User Guide.* (1992-1995). Redmond, WA: Edmark.

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